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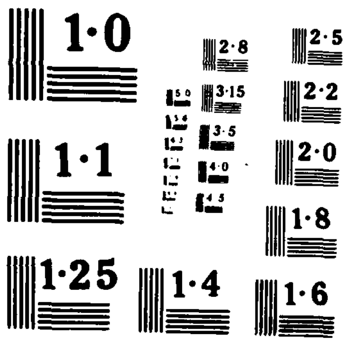
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STUDY PROJECT

OVERNIGHT PARTS/PACKAGE DELIVERY IN A THEATER ARMY

BY

LIEUTENANT COLONEL GEORGE F. FRANCIONI

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AUSTERE theaters of CENTCOM and SOUTHCOM. With the Army moving in a direction of high tech, high mobility, and often high cost, it is imperative that these systems be improved in order to achieve the desired efficiency level. The addition of a light utility aircraft company assigned at the theater level could solve portions of these problems. Lacking the cost and maintenance problems associated with the helicopter, this type of unit could provide a much needed link in streamlining the parts distribution system without drawing down critical helicopter and C-130 assets. The increase in parts distribution efficiency means more equipment ready to fight the battle when needed.

USAWC MILITARY STUDIES PROGRAM PAPER

OVERNIGHT PARTS/PACKAGE DELIVERY IN A THEATER ARMY

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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The purpose of this paper is to establish a concept of intratheater airlift support for a Theater Army. My comments herein are based on a literature survey, interviews, and personal experience in the fields of Army logistics and aviation. In streamlining and increasing the efficiency of a military system, the results can be both dollar savings and an increase in combat effectiveness. The Theater Armies of today lack a flexible and responsive repair parts distribution system. This problem is even more pronounced in the austere theaters of CENTCOM and SOUTHCOM. With the Army moving in a direction of high tech, high mobility, and often high cost, it is imperative that these systems be improved in order to achieve the desired efficiency level. The addition of a light utility aircraft company assigned at the Theater level could solve portions of these problems. Lacking the cost and maintenance problems associated with the helicopter, this type of unit could provide a much needed link in streamlining the parts distribution system, without drawing down critical helicopter and C-130 assets. The increase in parts distribution efficiency means more equipment ready to fight the battle when needed.

TABLE OF CONTENTS

OVERNIGHT PARTS/PACKAGE DELIVERY IN A THEATER ARMY

INTRODUCTION

It is recognized that our civilian counterparts in industry are always looking for ways to improve efficiency and profits. A good example of this is the overnight parts/package delivery systems that have sprung up worldwide within the last ten to fifteen years. To the modern businessman, time is money. To the modern soldier, time can be translated into readiness--or better yet--could be used as a force multiplier.

Most of the systems and agencies that support Theater Armies are well organized and mission oriented. It is not the intent of this paper to try to change these systems or support agencies, but rather to present alternatives for improving and streamlining the efficiency of combat units by speeding up the delivery of repair parts, and thereby increasing the availability of combat equipment. For example, if the Department of the Army average on Operation Readiness (OR) rate for UH-1H helicopter units in peacetime is 80% under the best of conditions and with a supply system set up to support this, what then would be the effect if the OR rate could be improved to 90%? This increased efficiency would have the effect of adding 10% more aircraft to the unit's Table of Organization and Equipment (TOE), and thus could be seen as a force multiplier. This same analogy would hold true for tank, artillery

or truck units. Getting the right parts to the right place in a timely fashion would increase the OR rate in most tactical units. In peacetime many replacement parts and systems are dollar driven, but times of war require a system which can accomplish the most expeditious distribution of repair parts and packages throughout a Theater Army. With the rapid move toward high technology and black boxes, the problem increases in both scope and priority.

The dollar value of some repair parts today prevents them from being stocked to desired levels. We see in aviation, for example, intensively managed items (AIMI) as well as selectively managed items (SIMS). The problem of just managing these "high priority parts" (for lack of a better word) is ever growing.

The other side of the problem, the one which this paper will address, is distribution of these repair parts or systems. At this point, it is well to remember that these parts can be anything from printed circuit boards, modules, line replacement units, aircraft instruments, or any of a larger number of parts required to keep radios, radar, tanks, trucks, and aircraft all effectively performing their desired mission.

To document the Army's problem with parts management, one need only to look at the worst case of the Theater Army environment for the logistician, the austere environment for the US Central Command (CENTCOM) for the Third US Army in Southwest Asia.

Southwest Asia presents the most severe case for the logistician for a number of reasons. These range from the distance from the wholesale supply system to communication, to severe inadequacies in road and railroad networks, to shallow water ports and large geographically hostile lands complete with large bodies of water to be crossed. A model system that would improve logistics management in that scenario would then be applicable to almost any Theater Army whether it be large or small, developed or austere.

EUROPE

Since CENTCOM has no deployed forces in its Area of Responsibility (AOR), and its systems must arrive in country with it, the best way to view this system is to take a look at how the parts/resupply system works under ideal conditions. Before considering the CENTCOM system, I will first discuss how this system works in Europe. In order to address the higher priority parts and maintain a systems orientation, I will address only the Air Lines of Communication (ALOC) Order Ship Time (OST).

The basic system now operating in Europe is called Direct Support System (DSS). This system breaks down the ALOC order ship time into cycle segments and shows the average OST in calendar days. The system starts with in-theater processing and ends at the Supply Support Activity (SSA). The total objective time for this process for Europe is twenty-three days.[1] In some cases it can be less, but in discussions

with an analyst at the European Distribution Offices, New Cumberland Army Depot, the actual time is probably closer to a total of twenty-six days.[2] Overall the system works well; the depots do an outstanding job of processing the requests, consolidating the loads and shipping them to one of three major airfields in Europe. The time objective up to this point is seventeen days, and not much can be done to further enhance this portion of the system. In rare cases this time may be reduced by the use of Special Assigned Airlift Mission (SAAM). Basically, this process has a commercial air carrier land close to a depot, pick up a load, and fly directly to Europe. Once in Europe, the cargo is normally given to another commercial carrier such as United Parcel Service (UPS) for delivery to the SSA or unit. The SAAM flights are used only for high priority time-sensitive equipment or parts.

The Theater Army could look to reduce the interval between the arrival of the cargo in Europe until the time it is received by the user. This time is optimally six days, while in reality it is closer to eight days.[3] The Army's current method starts at the Break Bulk point at the Point of Debarkation (POD). The portion of this system which some persons consider unreliable in wartime and slow in peacetime is that which gets the repair parts broken down for placement on trucks and then shipped via trucks to the user units.

Another important part of the Supply System is a cross leveling of supplies or transfer of spare parts from one unit to another. It is easy to see that a surge in combat would be difficult to forecast,

especially theater-wide. Intrabase or cross unit support would probably require better transportation arrangements than those which currently exist for this type of problem.

The criticality of an intratheater spare parts transportation system has been addressed by the US Air Force for its area needs in Europe. The result of their study was the addition of European Distribution System Aircraft (EDSA).

A United States Air Forces in Europe (USAFE) data for 1979 shows one thousand lateral shipments of spares a month to repair grounded aircraft.[4] Although Army data of this type is unavailable, it is reasonable to assume that similar statistics would apply to the Army, but on a larger scale.

The current transportation system in Europe does provide combined surface transport and airlift to move parts and repair equipment among installations. Geographical limitations of truck transport include long transit distances, impassable terrain, and water barriers. In times of war truck transport also suffers from limited road access and equipment shortages. The standard Army truck system could be utilized if the priority Army movements supporting an on-going battle are recognized.

Priorities create even greater problems for the airlift of spare parts. Although spare parts would probably make up less than one percent of theater tonnage, moving them does not have the highest priority, and the current system lacks adequate capacity even for all higher priority cargo in wartime. However, even if spare parts could be

placed aboard planes handling high priority loads, the routes these planes follow would not permit routine service of most US Army installations. This distance and servicing frequently make greater demands on the transportation system than load size does. Wartime conditions would require the transportation system to service bases frequently over greater distances. It is easy to see that one C-130 could easily carry the entire daily theater load of higher priority repair parts, but it could neither traverse so large an area nor make so many stops in one day. Thus the transportation problem is less one of loads and more one of service. Peacetime in Europe has seen the US Army as a steady customer of a commercial overnight air delivery service for both parts distribution and cross leveling between units. This method has proven effective, but it is doubtful that this service would be available in wartime.

It is imperative that any system we plan on taking to war must be in place during peacetime. Even in CONUS large numbers of repair parts are being shipped from depot to customer by Federal Express, UPS, and other independent air freight companies. Again, these systems work well in peacetime, but they will not deploy with the forces.

This problem has surfaced before. As recently as December, 1985, the 21st Support Command (SUPCOM) worked on an evaluation of Echelon Above Corps (EAC) forward support of high value, combat essential, printed circuit boards (PCB), modules, and line replacement units (LRU). The evaluation focused upon potential changes to the role of EAC EQUATE

detachments in a support forward role.[5] To accomplish this evaluation, the 166th Maintenance Detachment (EQUATE), which is normally co-located with the 903rd Maintenance Company, was relocated into the Reforger Exercise Area. The 166th established operations at an Army airfield and began operations in support of corps customers in its new EAC support role. One of the key objectives in the potential restructuring of EQUATE Detachment--MTOE'S is to include a supply holding area for forward support/exchange of PCB's, modules and LRU's.

Another purpose of this evaluation has been to provide information on establishing an ALOC in support of EAC forward support of critical communications and electronic PCB during Reforger 86. As a result, the 21st SUPCOM has refined forward support procedures in conjunction with the use of air assets to rapidly transport high value/combat essential PCB's and LRU's.

During the first two days of operation, three hundred sixty-one unserviceables were evacuated by air through the 166th Detachment to Pirmasen Commercial Maintenance Center (PCMC). All of the items processed by the detachment were identified in the USAREUR (TAMMC) Communications and Electronics Exchange List. The final detailed after-action report/lessons learned is scheduled to be out in April of 1986, but even before all the results are in, it can be seen that this innovative system using organic Army air for ALOC was able to cut down on the turnaround time for much needed high priority/value repair parts. The average time by truck to the PCMC was five hours, while the time by

air was only one hour and fifteen minutes. Two round trips daily were enough to meet the needs.[6]

This type of program brings up some valuable points. First, the repair parts hauled were not weight or bulk limited but small and high dollar value. It pointed out the need for a logistics system that would assure flexible distribution of critical parts between user and repair facilities. This system must be responsive to force employment changes and mission requirements of dynamic battlefield operations.

When considering this evaluation, one must remember that the 21st SUPCOM is dealing in a large mature theater. It had adequate road and rail networks, but it still needed high dollar, time sensitive repair parts. This is just another example of an area of the distribution system that could be enhanced through proper management, innovative techniques, and a responsive distribution system.

As mentioned earlier, the US Air Force saw an internal need for improved distribution, and corrected it with the advent of the EDSA. This merely took care of the Air Force's problem, and did nothing to alleviate the Army's problem. Sometimes the sheer size of the Army makes it difficult to identify its real requirements. As with any new or innovative system, it must first be requirement driven, and secondly, it must be cost effective. In a RAND study paid for by the US Air Force, both of these criteria were met.[7]

The discussions on Europe were meant to do two things: (1) to show that even in a large, well matured theater some of the repair parts

distribution system can be improved, and (2) to show that these problems are not unknown. The Air Force saw the problem, found a solution which would increase its combat effectiveness, and put that solution into effect. Yet there are important differences, as well as similarities, between the European scenario and that of Southwest Asia.

SOUTHWEST ASIA

The geographic area covered by the US Central Command is probably like no other area in the world for presenting a challenge to the logistics planners. In dealing with the doctrine and policies that were designed around Europe, many do not apply to the small areas (in terms of number of troops, not in land size) in the mature theater of Southwest Asia. Looking at the map quickly reveals the obvious lack of a well developed road network. Unlike Europe with its high speed autobahn, most of the Persian Gulf countries have gravel or unpaved roads. Population centers are smaller and farther apart. In Iran the sparce road network is very channelized and subject to easy interdiction. Under the most ideal conditions, it is doubtful that the road network could support large troop or resupply actions. The rail system in most Persian Gulf countries is again almost nonexistent. With the exception of some rail systems in Saudi Arabia, most of the rail networks are considered unusable.

Already the logistician is restricted in the amount he can carry because of road conditions and traffic. He is plagued with long hauls

in a hostile environment. Most straight line distance between points of interest within the Gulf region average between two hundred twenty to three hundred twenty-five nautical miles, distances almost too great for even the best of condtions. Logisticians in Southwest Asia must rely heavily on ALOC for supply and repair parts movement. In addition, many points of interest involve crossing the Persian Gulf itself, a distance of between fifty and one hundred fifty nautical miles. Again, there is a built-in dependence on air for resupply movements.

The lack of privately established repair facilities, and the lack of a commercial service such as Federal Express, UPS or other type of civilian transport system to support the military, create obstacles for the logistician. Air dependence remains heavy. One additional factor which compounds the problem is the climate of the area. The Gulf salt air, the fine-grained sand, and 130° F temperatures cause increased maintenance problems and place greater demands on the supply system.

In order to improve the supply distribution system, the various types of distributive systems should be compared. Although there are many distributive systems, I will discuss only the three which have military applications.

The first of these systems is that of "LINEAR LOC." It is most commonly used in road and rail networks, and is primarily of rear to front orientation. The problems with most Linear Loc are that it lacks flexibility and is not well suited for lateral distribution. This system is capable of high tonnage and is normally a slower system, hard

to secure, and not time sensitive. Linear Loc is not as efficent for aircraft as it is for surface vehicles.

The second system is that of a Hub Concept. This is the most common system in use by the private business sector. In this system, everything flows into one central hub for redistribution to outlying airports by small aircraft and then via truck to user. This system is easy to schedule and time sensitive. It does make the backhaul of repairables more difficult to manage and lacks flexibility for surge operations. Also one central hub means a larger concentration of men and equipment which presents a valuable target for an enemy.

The third system is the Modified Hub Concept. This system has all the advantages of the Hub Concept, but would retain a small percentage of aircraft for direct, lateral, and crossleveling of repair parts. It would also operate from two or three smaller hubs. The Modified Hub Concept would provide the most flexibility and time sensitivity and a more dispersed system.

It is important to note that all three systems described would have to be controlled by a Movement Control Center at the highest level having overall responsibility for the logistics operations.

AIRCRAFT

The C-130 has the capability to carry almost all of the required parts and materials to most of the airfields in Southwest Asia. Again,

it is not a question of weight or size, but of getting the right parts to the right place in a timely manner.

The first problem with the C-130 is that there are not enough of them to go around. The C-130, workhorse of the fleet, is limited in number, and because of the great distances between major cities within the AOR, is in great demand on long haul routes. On these long haul routes with heavy loads, the C-130 has no equal, but it is inefficient for use in making frequent short hauls with less than a full load. Using the C-130 for such types of missions is unrealistic because of the demands for it for longer, heavier hauls.

One answer to the problem could be "throughput." This is basically flying materials straight from CONUS to a forward base or a forward break bulk point. Yet in Southwest Asia, in a fluid combat environment, "throughput" would be difficult at best. For example, it is highly unlikely that a unit waiting for a repair part would still be in that location after three weeks, and be able to accept direct delivery of that repair part. However, the requirement would still be there for a break bulk point to off-load and see that the cargo gets shipped in the right direction to the user. Also there would still be a need for an internal distribution system from the break bulk points down to the user units, regardless of "throughput."

Currently there is no real dedicated Army cargo hauler sized between the C-130 and the UH-60 in service. The CH-47 helicopter is normally used for heavy external loads such as artillery movements and

is not normally dedicated to the carrying of smaller repair parts. The C-12 utility aircraft is normally configured for command and control and staff movement. Even though it can be used for transport of smaller repair parts, its limited numbers are unlikely to be dedicated as parts haulers, since this is a mission most C-12's are not configured to perform.

The workhorses of the Army fleet would be the UH-60 helicopter and the aging fleet of UH-1H's. Both helicopters have the ability to haul the right amounts of cargo and have the flexibility which Army commanders need, but helicopters have their disadvantages. The UH-1H lacks the ability to make the two hundred fifty nautical mile trips, and this distance is close to the range limits of the UH-60. In addition and most importantly of all, both these helicopters are inefficient in fuel and maintenance. At each end of a two hundred nautical mile flight, the helicopters would require refueling before the return flight, thus adding a logistical burden at the forward units where it is least desirable.

The helicopters do have the ability to land almost anywhere, but because of their limited numbers, they are usually required for forward support of troops and resupply movements. In forward areas of the AOR, reliable road networks are practically nonexistent, and troop and resupply tasks rely heavily on helicopters.

Helicopters are expensive, fuel-demanding, and not suitably designed for use in the longer range parts distribution mission. The

C-130, on the other hand, is service limited, not load limited. The shortcomings of both types of aircraft--the helicopter's lack of range and cost effectiveness and the C-130's nonavailabity for small, short hauls, point to a need for a mid-size and mid-range transporter capable of being flexible and responsive for distribution of repair parts. It now appears that what the civilian businessmen discovered about overnight and high priority parts delivery's importance in our fast-paced high-tech society is equally applicable to the US Army.

Business' solution to the problem was to use light single and twin engine aircraft to feed into and out of a hub airport. The hub airport would effect transshipment back to another smaller airport, and then by truck a short distance to the customer.

The Army has the trucks and the Air Force has the large hub airports. What is missing is the light utility aircraft for the center leg of the distribution system. As mentioned earlier, helicopters do not meet most of these requirements, and the larger aircraft will be given priority to deploying new units and will be unable to be dedicated to the support of existing units.

It is not within the scope of this paper to determine desired size and shape of a light utility aircraft, or even to determine whether this aircraft should belong to the Air Force or the Army. These questions must be answered at the highest levels. Also a cost survey, similar in scope to that which the Rand Study conducted for the Air Force, is needed to determine exactly what cost tradeoffs would entail. The

European Distribution System Aircraft was shown to be more than merely cost effective in providing the proper distribution of repair parts for the US Air Force F-15s and F-16s. What should be done now is to look at the types of typical mission requirements, the types of aircraft which might be considered for such missions, and lastly, the types of aircraft which have proved successful in similar civil operations. I would like to propose that depending on what concept is adopted, there are two ways to reach a force structure for the transportation portion of the concepts.

First is for the Army to organize and structure an aviation unit similar to older utility aircraft units, working for the Army commander. This type of unit would be easy to form and low cost. For peacetime, it could be split between Reserve and Active components for higher savings in manpower and money. This type of utility aircraft company would give the maximum flexibility for the Army commander.

The second possiblity is to expand the current Airforce system to the EDSA in place in Europe. It would be capable of performing the mission, but under the control of Military Airlift Command (MAC) would lack the flexibility and responsiveness the Army field commander would require. In addition, the USAF system would not be dedicated only to Army units and because of the size of these units and the equipment involved, it would probably cost much more.

In addition to discussing concepts and force structure, a brief look at possible types of aircraft is in order. The criteria used in

describing the three possible types of aircraft is no more than planning parameters, not a requirement. These parameters were concluded from information developed within the previous discussions.

In the support forward role and with operations from a break bulk point, most arriving cargo pallets average 4600 pounds, with the average container within the pallet weighing less than seventy pounds.[8] For the sake of discussion, I will assume a maximum aircraft payload would not exceed 4000 pounds under most conditions. In order to meet the round trip requirements, the aircraft must have an unrefueled range of at least seven hundred to seven hundred fifty nautical miles. In addition, in order to meet the flexibility requirement, it needs to be of a Short Take Off Landing (STOL) type which can operate on less than twelve hundred feet of unprepared surfaces. This means being able to take off and land on road surfaces and unprepared fields. This gives the commander the most flexibility in getting his repair parts distributed as far forward as possible.

There are a number of aircraft in existence or on the drawing boards which meet these requirements. One such aircraft is the civilian model Cessna Caravan. The Federal Express Corporation has ordered more than one hundred of these planes to meet their needs. This is a single engine aircraft designed to haul small cargo into and out of unprepared airstrips. The aircraft has excellent speed, range and maintenance and cost factors.

Another aircraft which might be considered is the UV-18 Twin Otter currently used by the US Army National Guard in Alaska. This is a Type Certified Army Aircraft, already in the system, and it could easily be expanded into a light utility aircraft unit with minimum research and development costs. It is a twin engine STOL aircraft, which meets all the above mentioned requirements.

A third consideration might be the V-22 Tilt rotor under development for the Marine Corps and Army. This aircraft is still under development, but it is designed to meet all the above mentioned requirements. The two drawbacks to this aircraft are its cost and the time lag involved in getting it into the system.

The Cessna Caravan and the UV-18 Twin Otter are relatively inexpensive aircraft and are currently in production. The system necessary for war operations tomorrow should be in place today, and not years down the road. Both the Cessna Caravan and the UV-18 Twin Otter could quickly and cost effectively (compared to helicopter cost) be formed into light utility aircraft companies.

Although a light utility aircraft unit dedicated to transporting repair parts and back hauling valuable repairables would solve some of the distribution problems, other changes would have to be made simultaneously. Most noteworthy changes should include: (1) a more accurate way of keeping up with the location of high priority repair parts requiring special package markings to designate these higher priority parts; (2) a system with a central control area directing the flow of

the parts and aircraft; and (3) a more dependable system of accounting for repairable items, perhaps a system similar to the one used by 21st SUPCOM during their Reforger Test.[9]

The dynamics of combat work against most planning objectives, especially when trying to forecast self-sufficient repair capabilities and spare parts inventories in the opening weeks of a conflict. Unanticipated shortages will occur and reoccur unequally across the theater because of differences in time involved in actual combat, equipment attrition, repair capabilities, and damage to inventories and facilities. Consequently, equipment availability rates, whether helicopter gunships or tanks, will depend on timely, effective, and mutual cooperation among support units. *An intratheater repair parts* distribution system could be designed to provide that support. The basic hypothesis is that higher availability rates of equipment in wartime can be generated at less cost than investing in additional spare parts inventories to achieve similar capabilities.

In combat, the shortage problems could also be aggravated by unpredictable failure rates, unequal or unanticipated usage or flying activity, differences in spares and repair assets, and unpredictable and unequal damage to spare parts and repair facilities. Even if the budget permitted stocking enough parts to anticipate theater-wide needs, local combat conditions are impossible to predict, and unanticipated shortages would arise requiring transportation to move additional spares to the areas of greatest need. Overnight parts delivery, while not the total

answer to logistic support, can increase effectiveness and, at the same time, provide greater flexibility and responsiveness to the needs of a Theater Army.

CONCLUSIONS

1. Even though the focus of this paper has been directed toward US CENTCOM, the overnight parts delivery concept can be applied to all other areas of the world.

2. The "Modified Hub Concept" provides the maximum flexiblity and responsiveness to the Army commander.

3. Overnight parts delivery in a Theater Army, while not the total answer to logistic support, can increase effectiveness and can be an important force multiplier.

RECOMMENDATIONS

1. The Army should adopt the concept of overnight parts delivery.

2. The Modified Hub Concept should be adopted to insure the greatest flexiblity in parts delivery.

3. The Army should form light utility aircraft companies and assign them to Theater Armies for accomplishment of this mission.

4. The Army should acquire the appropriate aircraft to support this system.

ENDNOTES

[1]US Department of the Army, Army Regulation 725-50, p. 133.

[2]Interview with Joe Bush and Gregg Mayer, DACs at the European Distribution Office, New Cumberland Army Depot, PA, 5 March 1986.

[3]Bush and Mayer.

[4]Rand Corporation. European Distribution System Aircraft Study, p. v.

[5]Col. Neil W. Meoni, PCB ALOC Evaluation. Information paper, 6 January 1986, p. 2.

[6]Ibid.

[7]Rand, p. 62.

[8]Bush and Mayer.

[9]Meoni, p. 3.

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